CLAIMS

1. A wavelength filter comprising:

a solid material that transmits a light;

a pair of flat planes formed on the sold material substantially in parallel with each other; and

a supporting member that supports the solid material on a plane of the solid material other than the pair of flat planes with an adhesive agent, the supporting member having a rigidity stronger than that of the solid material, wherein

the light is resonated between the pair of flat planes,

the wavelength filter selects a wavelength that is determined by an optical length between the pair of flat planes, and

the solid material is a birefringent material of which an optical axis makes a predetermined angle with respect to a normal to the pair of flat planes.

2. The wavelength filter according to claim 1, wherein the predetermined angle between the normal to the pair of flat planes and the optical axis is set so that a temperature coefficient of the optical length between the pair of flat planes has a predetermined value in a state in which the birefringent material is fixed on the supporting member.

3. The wavelength filter according to claim 2, wherein the predetermined angle between the normal to the pair of flat planes and

the optical axis is set so that an absolute value of a sum of a product of a difference between linear expansion coefficients of the birefringent material and the supporting member and refractive index of the birefringent material, a thermooptical coefficient of the birefringent material, and a change of refractive index due to a thermal strain between the supporting member and the birefringent material is minimized.

4. The wavelength filter according to claim 3, wherein the birefringent material is any one of an α-BBO crystal, an $LiIO_3$ crystal, a $CaCo_3$ crystal, and a β-BBO crystal.

5. The wavelength filter according to claim 4, wherein

light incident on the birefringent material uses a polarization assorted along an ordinary light axis,

when the birefringent material is $CaCo_3$ crystal, an angle of an optical axis with respect to a light axis is set to a vicinity of approximately 67 degrees, and

when the birefringent material is α-BBO crystal, an angle of an optical axis with respect to a light axis is set to a vicinity of approximately 90 degrees.

6. A wavelength monitoring apparatus that detects a wavelength of a laser light output from a semiconductor laser, the wavelength monitoring apparatus comprising:

a wavelength filter that includes a solid material that transmits the laser light, and a pair of flat planes formed on the sold material substantially in parallel with each other, the wavelength filter selecting a wavelength determined by an optical length between the pair of flat planes in a cycle by resonating the laser light between the pair of flat planes;

a wavelength detecting unit that measures an emission wavelength of the laser light based on a transmission light from the wavelength filter; and

a supporting member that supports the wavelength detecting unit and the wavelength filter on a plane of the wavelength filter other than the pair of flat planes with an adhesive agent, the supporting member having a rigidity stronger than that of the solid material, wherein

the solid material is a birefringent material of which an optical axis makes a predetermined angle with respect to a normal to the pair of flat planes.

7. The wavelength monitoring apparatus according to claim 6, wherein

the laser light output from the semiconductor laser is polarized in one direction, and

the predetermined angle between the normal to the pair of flat planes and the optical axis is set so that a temperature coefficient of the optical length between the pair of flat planes has a predetermined

value in a state in which the birefringent material is fixed on the supporting member.

8. The wavelength monitoring apparatus according to claim 7, wherein the predetermined angle between the normal to the pair of flat planes and the optical axis is set so that an absolute value of a sum of a product of a difference between linear expansion coefficients of the birefringent material and the supporting member and refractive index of the birefringent material, a thermooptical coefficient of the birefringent material, and a change of refractive index due to a thermal strain between the supporting member and the birefringent material is minimized.

9. The wavelength monitoring apparatus according to claim 8, wherein the birefringent material forming the wavelength filter is any one of an α-BBO crystal, an $LiIO_3$ crystal, a $CaCo_3$ crystal, and a β-BBO crystal.

10. The wavelength monitoring apparatus according to claim 9, wherein

light incident on the birefringent material uses a polarization assorted along an ordinary light axis,

when the birefringent material is $CaCo_3$ crystal, an angle of an optical axis with respect to a light axis is set to a vicinity of approximately 67 degrees, and

when the birefringent material is α-BBO crystal, an angle of an optical axis with respect to a light axis is set to a vicinity of approximately 90 degrees.

11. The wavelength monitoring apparatus according to claim 6, further comprising a lens that adjusts a spot size of the laser light output from the semiconductor laser, and outputs the laser light with the spot size adjusted to the wavelength filter.

12. The wavelength monitoring apparatus according to claim 6, wherein the wavelength detecting unit includes

a first photodetector that detects a transmission light from the wavelength filter;

a second photodetector that directly detects the laser light output from the semiconductor laser; and

a wavelength detector that detects an emission wavelength of the laser light using a ratio of detecting signals from the first photodetector and the second photodetector.